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CENTRAL INTELLIGENCE AGENCY
INFORMATION
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FOREIGN DOCUMENTS OR RADIO BROADCAST

COUNTRY USSR
SUBJECT Scientific research
HOW PUBLISHED Monthly periodical
WHERE PUBLISHED Moscow
DATE PUBLISHED 1943
LANGUAGE Russian

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SOURCE Zhurnal Fizicheskoy Khimii, No 5-6, 1943. (Requested.)

THE PHYSICAL CHEMISTRY INSTITUTE DMITRI KARPOV
AND ITS ROLE IN THE DEVELOPMENT OF PHYSICAL
CHEMISTRY IN THE USSR

Academician N.N. Semenov

LITERATURE

INTRODUCTION

General Account of the Institute

Director: Academician A. F. Bakh
Deputy Director: Academician A. N. Frumkin
Early Members: Frumkin, Kazarnovskiy, Medvedev, Rabinovich.
Distinguished Alumni: Corresponding Members of the Academy of Sciences USSR: Kazarnovskiy, Medvedev, Rabinovich, Syrkin, and others. Able scientific organizers: S. V. Kartanov, V.A. Kargin, I.V. Petryanov, M.I. Tomkin, A.A. Zhukhovitskiy, and others.
Promising Scientists: Bagdasaryan, Brauer, Dolin, Dyatkin, Ersher, Kolotyrlin, Likhovetsov, Pabazhetakiy, Tunitakiy, Vasil'ev, Veselovskiy, and others.

The Institute is one of the leading research organizations in the field of electrochemistry, although, as will be seen, its work is by no means confined to this branch of science. Ten of its projects have been awarded Stalin Prizes for science and invention; it has also received the Order of the Red Banner of Labor. Many illustrious foreign scientists correspond with the Institute; many also have visited Moscow in order to gain a first-hand knowledge of its work.

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Academician A. N. Bakh

In 1885 Bakh left Russia for political reasons (the suppression of the "Narodnaya Volya" society). He returned in June 1917 and met I. Ya. Karpov, chemical engineer and Bolshevik. After the October Revolution, Karpov became a leading figure in the Soviet chemical industry and asked Bakh to form a research laboratory in Moscow. Bakh agreed and started work immediately with eight colleagues on the fifth floor of an apartment house. V. V. Anybyshev and S. G. Orzhonikidze assisted him in equipping the Institute. Karpov died in 1922 and the Institute was named after him. Since then, Bakh has been in sole charge of the Institute.

Academician A. N. Frumkin

Frumkin was one of the first members of the Institute. He became Deputy Director in 1929. An efficient administrator, he spends much time in organizing scientific conferences.

Work and personnel of the Institute may be divided into three groups as follows: (1) surface phenomena and electrochemistry (Frumkin, Kargin, Petryanov, Rabinovich, Temkin, Zhukhovitskiy); (2) structure of matter (Kazarnovskiy, Monoszon, Gornant, Syrkin); and (3) chemical kinetics (Bakh, Kagan, Medvedev, Rabinovich, Syrkin, Temkin).

Group 1

Surface Phenomena Laboratory. Head, Academician A. N. Frumkin (First-class Stalin Prize). Frumkin's associates and their subjects are: Dolin, platinum electrodes; Ershler, batteries, anode solution of platinum, and platinum electrodes; Gorodetskiy, theory of double layer; Kabanov, batteries and theory of double layer; Kolotyrkin, solubility of pure metals in acids; Levina, hydrogen over voltage; Obrucheva, solid electrolytes; Proskarin, electrocapillary curves; Shlygin, platinum electrodes; Spiridonov, air depolarizer (awarded Stalin Prize); and Zarinskiy, hydrogen over voltage. Frumkin's pupils are: Burns, Burakhteyn, Ershler, Kabanov, Levina, and Proskurnin. Researchers assisted by Frumkin's work are: Boudan, Val'mer, Geyrovskiy, Gui, Karpachev, Raydil', Shtern, and Yesin. Rabinovich carried out a classical series of experiments at the Institute of the electrochemistry of colloids.

Laboratory of Colloidal Chemistry. Head, V. A. Kargin, who is the leading USSR authority on the physical and chemical properties of high molecular compounds. I. V. Petryanov specializes in colloidal dispersal systems, in particular, smokes and fogs. N. N. Tunitakiy has evolved a theory of coagulation.

Laboratory of Adsorption Processes. Head, Prof. A. A. Zhukhovitskiy. His associates and their subjects are: Saminskiy, sorption dynamics; Tikhonov, sorption dynamics; and Zabezhinakiy, sorption dynamics and kinetics of sorption of vapors. M. I. Temkin specializes in heterogeneous catalytic reactions. Together with Pyzhev, he has studied equilibria of ammonia.

Group 2

Structure of Matter Laboratory. Head, Ya. K. Syrkin. I. A. Kazarnovskiy has studied amphoteric oxides and the solubility of gases in liquids. Kazarnovskiy's associates and their subjects are: Zernil', structure of strontium and barium peroxides; Gladyshev, kinetics for formation of the quaternary ammonium base salt from gaseous compounds; Nikol'skiy, design of two new chemical plants (project received Stalin Prize); and Bakhshteyn, composition of "potassium trioxide."

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Zhukovitskiy specializes in quantum chemistry, and has worked with Geytler on energy of combination and activation. Syrkin has made a special study of dipolar moments. Syrkin's associates and their subjects are: Dyatkin, ionic, homeopolar, and transitional structures; and Vasil'yev, measurement of moments of 120 organic molecules.

Inorganic Chemistry Laboratory. Head, B. F. Ormont. This laboratory deals with various general problems of inorganic chemistry, e.g., the relation between the stability of compounds and valency electrons. Boron carbide is now manufactured on an industrial scale by a method devised by Ormont and Shafran.

X-Ray Laboratory. Head, G. S. Zhdanov. This laboratory has investigated structure of titanium nitride, titanium chloridoamine, boron carbide, Na_2BeF_4 , $\text{K}_3\text{Co}(\text{CN})_6$, etc. Submicroscopic crystals in nickel hydroxide have been measured. X-ray methods of production control have also been studied. V. A. Kargin studied the structure of high polymers, e.g., cellulose. A. G. Pasyanskiy determined the degree of solvation by measuring the speed of sound in the liquid. A. M. Monoszon has studied solutions in liquid ammonia and other compressed gases. A. I. Shotensteyn applies spectrographic measurement to the theory of acids and bases. Pleakov has obtained important results on electrode potentials in nonaqueous solvents.

Group 3

A. N. Bakh's subjects include molecular oxygen and respiration. S. S. Medvedev has studied the mechanism of oxidation, polymerization, and the decomposition of hydrocarbons. Medvedev's associates and their subjects are: Abkin, binary polymerization systems, catalytic polymerization, and polymerization of isobutylenes; Bagdasar'yan, polymerization of isobutylenes; Gantmakher, polymerization of isobutylenes; Gindin, polymerization of chloroprene; Kamenskaya, polymerization of vinyl acetate and styrol; Khomikovskiy, polymerization of isobutylenes; and Lazareva, polymerization of chloroprene. M. Ya. Kagan's speciality is heterogeneous catalysis. Kagan's associates and their subjects are: Cherntsov, synthesis of complex ethers from alcohols; Gladyshev, isopentane into isoprene; Lyubarskiy, catalysts for dehydration of butane and propane; Merkurov, butylene into divinyl group; Mitsengendler, catalysts for dehydration of butane and propane; Morozov, sorption of hydrogen, carbon monoxide and ammonia; Natanson, catalyst for dehydration of ethylbenzen; Podurovskiy, sorption of hydrogen, carbon monoxide and ammonia; Pshchetskii, butylene into divinyl group; and Rabinovich, butylene into divinyl group. M. I. Temkin specializes in the field of heterogeneous catalytic reactions. His associates are: Mikhaylov, reaction of carbon dioxide with hydrogen on platinum; and Pyshev, oxidation of nitric oxide on glass.

Photochemical Laboratory. Head, A. I. Rabinovich. Bagdasar'yan, Natanson and Pyshev have studied developers and silver bromide.

CONCLUSION

Semenov concludes his article as follows: "The Institute also plays an important part in the successes of our country's chemical industry. This was especially true during the war. For reasons which will be understood, I cannot describe this side of the Institute's activities. I can only say that, in our people's great struggle with their deadly enemy, the Institute honorably performed its assigned tasks. Its theoretical achievements found wide application in equipping our army and strengthening the home front."

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